Transmissibility of MERS-CoV Infection in Closed Setting, Riyadh, Saudi Arabia, 2015

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To investigate a cluster of Middle East respiratory syndrome (MERS) cases in a women-only dormitory in Riyadh, Saudi Arabia, in October 2015, we collected epidemiologic information, nasopharyngeal/oropharyngeal swab samples, and blood samples from 828 residents during November 2015 and December 2015–January 2016. We found confirmed infection for 19 (8 by reverse transcription PCR and 11 by serologic testing). Infection attack rates varied (2.7%–32.3%) by dormitory building. No deaths occurred. Independent risk factors for infection were direct contact with a confirmed case-patient and sharing a room with a confirmed case-patient; a protective factor was having an air conditioner in the bedroom. For 9 women from whom a second serum sample was collected, antibodies remained detectable at titers ≥1:20 by pseudoparticle neutralization tests (n = 8) and 90% plaque-reduction neutralization tests (n = 2). In closed high-contact settings, MERS coronavirus was highly infectious and pathogenicity was relatively low.

Middle East respiratory syndrome (MERS) coronavirus (CoV) is a zoonotic virus (*1*). Approximately 2,266 laboratory-confirmed cases of MERS have been reported to the World Health Organization (WHO) (*2*) since the identification of the first human cases in 2012 (*3*,*4*).

Although the primary source of human infections is MERS-CoV–infected dromedaries, the modes of transmission from dromedaries to humans remain unclear (*5*). Human-to-human transmission has occurred primarily in healthcare settings (*6*), sometimes resulting in large explosive outbreaks (*7*,*8*). However, to date, no sustained human-to-human infection has been detected. Few outbreaks of MERS-CoV outside of healthcare settings have been documented, and limited transmission within families has been reported, but secondary attack rates in households or in settings outside of healthcare facilities (e.g., farms) seem to be low (*9*).

The nonspecificity of clinical definitions for MERS-CoV and the tendency of surveillance to focus on severe cases suggest that the prevalence of mild or asymptomatic infection cannot be estimated from case-based clinical surveillance alone (*10*). Mild or asymptomatic cases have been identified from contact tracing of laboratory-confirmed case-patients in several countries, including Saudi Arabia, the United Arab Emirates, Qatar, and South Korea (*11*–*16*).

In early October 2015, a cluster of MERS-CoV infections was identified among expatriate women working for a women-only university in Riyadh, Saudi Arabia. At the time the outbreak investigation was initiated, Kingdom of Saudi Arabia (KSA) Ministry of Health officials had identified 8 MERS case-patients by reverse transcription PCR (RT-PCR) (*17*); all patients were epidemiologically linked through their place of residence, a dormitory that housed expatriate women. Two additional laboratory-confirmed cases were identified among healthcare workers who had been exposed to the first case-patient, who had sought treatment at a medical clinic near the residence (*17*).

As part of this outbreak investigation, we conducted a molecular and seroepidemiologic study of the residents of an expatriate dormitory where the initial case-patients lived. Our goal was to describe and characterize the outbreak, determine potential source(s) of the outbreak, estimate the extent of MERS-CoV infection among residents, and evaluate risk factors for infection among residents.

Methods

Selection and Recruitment of Study Participants

We used the MERS-CoV standardized serologic investigation protocol developed by WHO and the Consortium for the Standardization of Influenza Seroepidemiology (*18*)

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and adapted it to the context of this outbreak. All 828 residents of the women-only expatriate dormitory in Riyadh were informed of the purpose of the outbreak investigation by KSA Ministry of Health official field teams and asked in person to participate. The KSA Ministry of Health, WHO, and Institut Pasteur field teams provided information sessions about the study and about MERS-CoV. The response team established a nursing station within the residential compound and assigned 2 nurses to reside within the compound to follow up with exposed persons and keep a log of any medical complaints from the residents throughout the outbreak period. Because this outbreak investigation was part of a public health response, it was not considered by the KSA Ministry of Health, Institut Pasteur, or The University of Hong Kong to be research that was subject to review by an institutional review board. As such, written informed consent was not required.

Included in the investigation were all residents of the dormitory who orally provided consent for completion of a questionnaire; collection of a nasopharyngeal or oropharyngeal swab sample, or both; and collection of a blood sample for serologic testing. Exclusion criteria included being <16 years of age at the time of recruitment, having any contraindication to venipuncture, or both.

The interviewers were trained to use the data collection forms developed for this investigation; because most residents were from the Philippines, the questionnaire was translated into Tagalog (Appendix, https://wwwnc.cdc.gov/EID/article/25/10/19-0130-App1.pdf). Each question was read aloud to women in groups of 15–25 in the dormitory while they filled in the questionnaire by hand. A subset of more sensitive questions was administered one-on-one by a member of the investigation team over the course of the 3-day field investigation. Before study implementation, frontline staff, including all outbreak investigation personnel, were trained with regard to infection control procedures, including proper hand hygiene and the correct use of respiratory face masks, to minimize their own risk for infection when in close contact with patients during home visits and elsewhere and to minimize the potential risk for MERS-CoV transmission between participants or between households.

Specimen Collection and Testing for MERS-CoV

Any participant who reported respiratory symptoms during the initial investigation (October 19–28, 2015) or during a 14-day follow-up period (after last contact with a confirmed/suspected MERS-CoV patient) was immediately isolated, and nasopharyngeal/oropharyngeal swab samples were collected and tested for MERS-CoV by RT-PCR. RT-PCR testing of human biological specimens was conducted at the Riyadh Regional Laboratory by use of standardized RT-PCR methods for MERS-CoV testing (*19*). Any participants with a positive MERS-CoV result by RT-PCR according to WHO criteria (*10*) were reported to WHO under the requirements of the International Health Regulations (2005) (https://www.who.int/ihr/9789241596664/en).

On November 1–2, 2015, a total of 5 mL of blood was collected from consenting residents of the compound. The blood was collected in a serum collection tube according to standard procedures and labeled with a coded identification number linked to the data collection forms. Transport of specimens within national borders complied with the applicable national regulations of Saudi Arabia. International transport of MERS-CoV specimens followed applicable international regulations (*20*).

Serologic assays used to detect and confirm seropositivity in the serum samples were MERS-CoV S1 IgG ELISA (EUROIMMUN EI 2604–9601G kit, https://www.euroimmun.com), MERS-CoV spike pseudoparticle neutralization test (ppNT), and 90% plaque-reduction neutralization test ($PRNT_{90}$). Serologic testing for MERS-CoV antibodies was conducted at the University of Hong Kong, as previously described (*21*). All serum samples were screened by MERS-CoV S1 ELISA, and positive or equivocal samples were further tested by ppNT and $PRNT_{90}$. Serologic results were interpreted as positive if $PRNT_{90}$ or ppNT titer for either the first or second serum specimen was ≥1:20.

Statistical Analyses

We entered all data for analysis in the entry form in Epi Info 3.5.4 (https://www.cdc.gov/epiinfo) and exported it to statistical software Stata 14 (https://www.stata.com). We estimated risk factors for infection among case-patients and non–case-patients (risk ratios [RRs] and 95% CIs) and within a nested case–control study (odds ratios [ORs] and 95% CIs) by restricting analyses to residents living in villas in which laboratory-confirmed cases had been identified.

Results

The first patient in this cluster who had laboratory-confirmed MERS was a 27-year-old woman who worked as a janitor in a women-only university in Riyadh. She reported experiencing dry cough and fatigue on October 1, 2015; she sought care at a private healthcare clinic on October 4 and was provided treatment and sent home the same day. On October 7, after signs and symptoms worsened to include fever, shortness of breath, productive cough, and signs of pneumonia, she again sought care in the same healthcare clinic, and a diagnosis of MERS was suspected. On October 8, a nasopharyngeal sample was collected and the patient was transferred to a public hospital in Riyadh, designated for isolation and treatment of MERS patients. MERS-CoV infection was confirmed on October 9. A second case in this cluster has recently been described (*22*).

The first patient resided in an enclosed, women-only, expatriate dormitory composed of 24 villas (Figure 1). Each

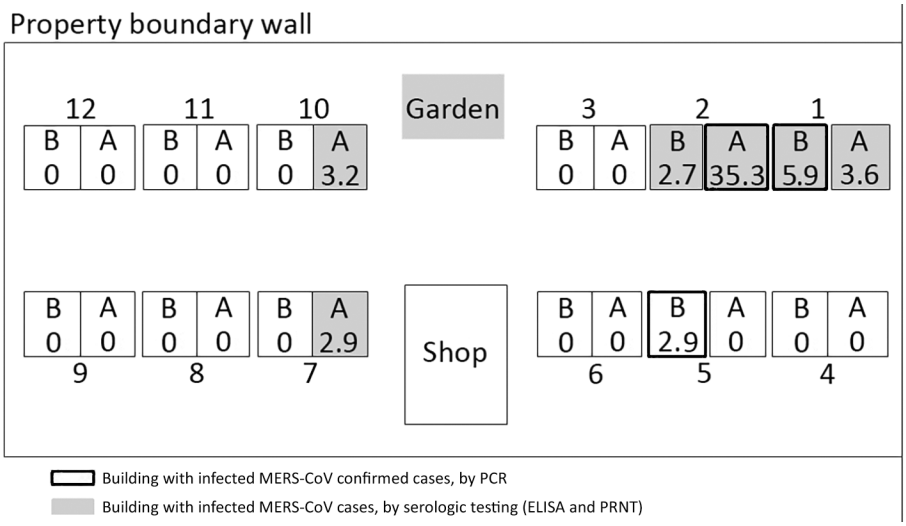

Figure 1. Schematic of expatriate dormitory (the residence, buildings 1–12) and MERS-CoV infection attack rates (IARs), Riyadh, Saudi Arabia, 2015. Each building contained 2 villas on 3 floors. The distance between buildings is ≈5 m. During the initial investigation (October 2015), 8 residents were positive for MERS-CoV by PCR (indicated by black boxes); they lived in buildings 1B, 2A, and 5B. A vegetable garden separated buildings 3 and 10, and a convenience store (shop) separated buildings 6 and 7. IARs are shown as percentages inside each villa. MERS-CoV, Middle East respiratory syndrome coronavirus; PRNT, plaque-reduction neutralization test.

villa is a 3-story building with 7 bedrooms (2 on the ground floor, 3 on the first floor, and 2 on the second floor) and is inhabited by 24–50 women. On inspection of the living quarters, the field team found that most of the windows in the bedrooms were closed and sealed and that ventilation within the bedrooms was poor. Initial open-ended interviews with some residents informed the study team that residents shared the same kitchen and dining room within the villa but did not typically eat together or share food at mealtimes. There were no designated social spaces; however, residents reported gathering around laptops to watch movies together.

A total of 828 women who lived in the residence complex were included in the seroepidemiologic study; none of the eligible women refused to participate. All participants were female, and median age was 35.1 (26.6–41.3) years. None were Saudi Arabia nationals; they were from the Philippines (84.6%), Sri Lanka (6.4%), Indonesia (2.9%), Nepal (1.6%), and India (1.1%) (Table 1). A total of 49 participants (1 case-patient and 48 non–case-patients) reported having ≥1 chronic condition (e.g., asthma, diabetes, heart disease, hypertension, breast cancer) (Table 1). The MERS case-patient reported having asthma; among non–case-patients, the most common chronic conditions reported were asthma (31%), diabetes (25%), and hypertension (18%).

In terms of occupation, almost half (49.1%) of participants reported working at the women-only university in Riyadh, including 17 (89.5%) of the MERS case-patients (Table 1). Participants reported working in 1 of 4 hospitals as either their primary or secondary occupation (Table 1).

Contact tracing of the initial patient and molecular and serologic laboratory test results identified an additional 18 MERS-CoV infections (Figure 2; Table 2). Of the 19 total case-patients, 12 (63.2%) were from villa 2A; 2 (10.5%) were from a facing villa (1B); and 1 case (5.3%) was reported from each of 5 villas either close to the mostly affected villa (2A) or 2 other villas (10A and 7A) populated with residents from the Philippines (Figure 1).

Among the 8 MERS-CoV cases positive by PCR, 8 were also serologically positive for MERS-CoV (Table 2). According to $PRNT_{90}$ or ppNT serology results for either the first or second serum sample, an additional 11 persons were serologically positive for MERS-CoV infections. Therefore, a total of 19 of the 828 dormitory residents had evidence of MERS-CoV infection by molecular or serologic testing or both; the infection attack rate [IAR] for the cohort was 2.3%.

Of the 9 patients from whom a second sample was collected in March 2016, a total of 8 had ppNT titers of ≥1:20, and only 2 of these had $PRNT_{90}$ titers of ≥1:20. For 2 of these 8 patients, ppNT indicated a ≥4-fold fall in antibody titer; for the others, ppNT antibody levels remained within 2-fold that of the initial serum sample.

Bivariate analyses indicated significant assocations between MERS and the following risk factors: having direct contact with a known MERS patient (RR 10.9, 95% CI 6.7–17.6); sharing a bedroom (RR 25.5, 95% CI 10.3–63.1), kitchen (RR 15.5, 95% CI 5.4–44.2), bathroom (RR 25.5, 95% CI 10.3–63.1), meal (RR 19.4, 95% CI 7.5–50.3), or transportation vehicle (RR 11.8, 95% CI 4.9–28.5); and having indirect contact with a known patient (RR 15.5, 95% CI 5.4–44.2) (Table 3). The presence of a chronic condition did not vary by MERS infection status. According to multivariate analyses, direct contact with a known MERS patient (OR 27.6, 95% CI 8.4–91.0) and sharing a bedroom with a MERS patient (OR 5.7, 95% CI 1.5–22.5) remained statistically significant. Having a functioning air conditioner in the bedroom was protective (OR 0.15, 95% CI 0.03–0.82). None of the women reported traveling outside of Saudi Arabia in the 14 days before symptom onset (data not shown).

Table 1. Demographic characteristics of participants with and without MERS-CoV infection in study of MERS-CoV transmissibility in a closed setting, Riyadh, Saudi Arabia, 2015*

Characteristics	All participants, no. (%), n = 828	Case-patients, no. (%), n = 19†	Non–case-patients, no. (%), n = 809
Sex			
F	814/814 (100)‡	19/19 (100)‡	795/795 (100)‡
M	0	0	0
Nationality	779	19	760
Filipino	659 (84.6)	19 (100)	640 (84.2)
Sri Lankan	50 (6.4)	0	50 (6.6)
Nepali	12 (1.5)	0	12 (1.6)
Bangladeshi	28 (3.6)	0	28 (3.7)
Indonesian	22 (2.8)	0	22 (2.9)
Indian	8 (1.0)	0	8 (1.0)
Highest level of education reached	779	19	761
Primary school	80 (10.3)	1 (5.3)	79 (10.4)
High school	377 (48.4)	10 (52.6)	368 (48.4)
University/diploma	234 (30.0)	4 (21.1)	230 (30.3)
Postgraduate degree	77 (9.9)	4 (21.1)	73 (9.6)
No education	11 (1.4)	0	11 (1.4)
Primary occupation	770	19	751
Women-only university	378(49.1)	17 (89.5)	361 (48.1)
Public university	12 (1.6)	0	12(1.6)
Hospital A	32 (4.2)	0	32 (4.3)
Hospital B	238 (30.9)	2 (10.5)	236 (31.4)
Hospital C	54 (7.0)	0	54 (7.2)
Hospital D	56 (7.3)	0	56 (7.5)
Secondary occupation	83/805 (10.3)	3 (15.8)	80 (10.7)
Hospital A	NA	2 (10.5)	17 (2.3)
Hospital D	NA	1 (5.3)	10 (1.3)
Other (health club)	NA	0	53 (7.0)
Any underlying medical conditions	49/780 (6.3)	1 (5.0)	48/761 (6.3)
Regularly smoke (% daily)	10/773 (1.3)	1/19 (5.6)	9/755 (1.2)
Current chronic conditions§	49/780 (6.3)	1/19 (5.3)	48/761 (6.3)

*Median age (interquartile range): for all, 35.1 (26.6–41.3) years; for case-patients, 29.8 (28–37.2) years; for non–case-patients, 35.2 (29.6–41.4) years. CoV, coronavirus; MERS, Middle East respiratory syndrome; NA, not applicable.
†Molecular or serologic evidence of MERS-CoV infection.
‡Denominator indicates the number of women who answered the question.
§Included asthma, diabetes, heart disease, hypertension, and breast cancer.

Discussion

This study details the comprehensive investigation of a cluster of MERS cases reported outside a healthcare-associated or camel industry–associated occupational setting. In this women-only, expatriate worker dormitory in Riyadh, Saudi Arabia, the overall IAR of 2.3% is similar to that found in a household contact study conducted in 2014 (IAR of 4.3%) (*9*). However, in this outbreak, the residential setting was more crowded than typical single-family households. Although we found the IAR in some villas to be low, we identified IARs as high as 35.3% (12/34) in 1 villa (2A), probably because of the exceptionally crowded living and sleeping conditions. Within this villa, 12 women were infected with MERS-CoV but only 10 reported any symptoms. Rates of IAR were not affected by the presence or absence of underlying conditions or the median age of residents by villa.

This study identified the independent risk factors for infection to be direct contact and sharing a bedroom with a MERS patient. Findings from other serologic studies have been similar (*23*). We hypothesize that the increased human-to-human transmission within villas resulted from the clustering of the women's activities. For example, the same women who lived together typically ate and socialized together, worked together, and traveled to and from work together. These activities added to the likelihood of intense direct physical contact among the women and probably led to limited but effective human-to-human transmission within their residence.

Globally, the extent of human-to-human transmission outside of healthcare facilities is uncertain, and whether MERS-CoV has the potential for sustained community transmission is unclear. Transmission among family members seems to be limited but can be amplified in healthcare settings (*24*,*25*) among persons with underlying medical conditions and to healthcare workers. Contributors to propagation of MERS-CoV infection in healthcare facilities include aerosol-generating procedures such as intubation, suction, and collection of nasopharyngeal swabs (*26*). Compared with the total number of MERS-CoV infections reported to WHO to date, patients in our study cohort were significantly younger (median age 32 vs. 52 years, respectively), healthier (6.3% vs. 41.0% reporting ≥1 chronic condition), and more likely to be female (0 vs. 68.1% male) (*27*).

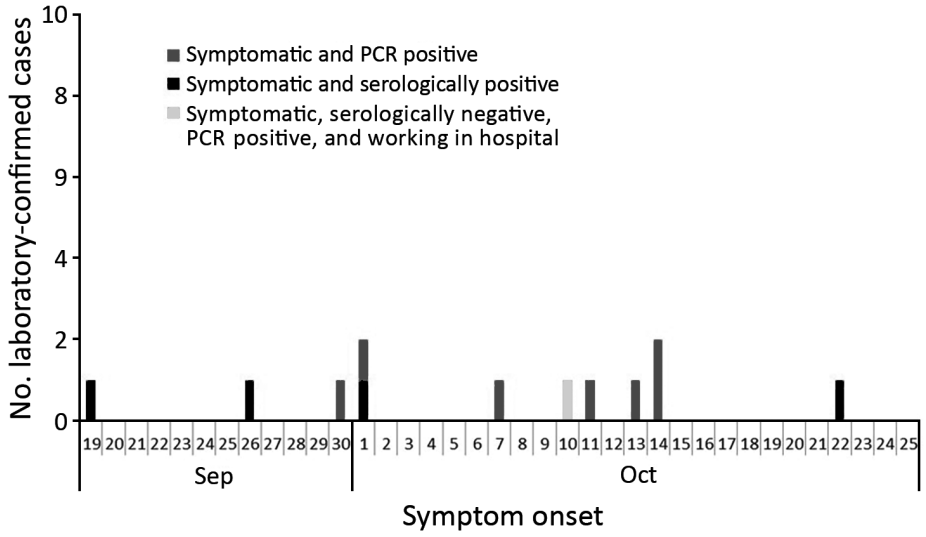

Figure 2. Epidemiologic curve for symptomatic laboratory-confirmed case-patients with Middle East respiratory syndrome coronavirus infection, Riyadh, Saudi Arabia, 2015. The curve includes only the 12 case-patients for whom symptom onset was reported, not the 7 case-patients for whom infection was serologically confirmed but no symptoms were reported in the preceding 4 weeks.

Healthcare staff can prevent human-to-human transmission of MERS-CoV through stringent adherence and implementation of detailed and clear protocols for standard, droplet, and aerosol infection prevention and control (IPC) measures among the various persons within a healthcare setting (i.e., healthcare workers, patients, and visitors) (*28*). Such IPC measures were not followed by the inhabitants of the dormitory in this study.

Although we were able to rule out a connection to dromedary camels, we were not able to specifically determine the source of this outbreak. Of the 19 laboratory-confirmed case-patients, 17 reported working at the same women-only university in Riyadh and the other 2 worked primarily as cleaners at the same healthcare facility in Riyadh (hospital B). Of these 19 case-patients, 3 also reported having a secondary place of employment, including working as cleaners at 2 other hospitals in Riyadh (hospitals A and D). We hypothesize that 1 of the 19 infected women identified in this investigation may have been exposed to and infected with MERS-CoV while working as a cleaner in a healthcare facility

Table 2. Characteristics of MERS-CoV–positive participants identified from molecular and serologic assay results in study of MERS-CoV transmissibility in a closed setting, Riyadh, Saudi Arabia, 2015*

					Serologic test						
					SI ELISA		ppNT		$PRNT_{90}$		Serologic
Age, y	Bldg no.	Signs/ symptoms†	Symptom onset date	RT-PCR‡	First sample	Second sample	First sample	Second sample	First sample	Second sample	test result§
23	1B	Yes	Oct 11	+	1.586	0.523	80	20	20	10	+
28	5B	Yes	Oct 14	+	2.225	NA	80	NA	40	NA	+
29	2A	Yes	Oct 13	+	1.181	NA	20	NA	10	NA	+
29	2A	Yes	Oct 14	+	4.57	NA	160	NA	80	NA	+
28	2A	Yes	Oct 1	+	3.154	2.741	160	160	40	40	+
26	2A	Yes	Oct 7	+	3.154	NA	160	NA	40	NA	+
39	2A	Yes	Sep 30	+	1.553	NA	40	NA	20	NA	+
53	2A	No	NS	+	4.242	NA	160	NA	80	NA	+
41	1B	No	NS	NA	1.311	0.33	20	10	10	<10	+
37	2A	Yes	Oct 10	–	1.214	0.569	40	20	10	<10	+
30	2A	Yes	Oct 22	–	0.759	0.605	20	20	0	<10	+
24	2A	Yes	Oct 1	–	1.422	NA	80	NA	20	NA	+
32	2A	Yes	Sep 26	–	3.381	1.012	80	20	20	10	+
28	2A	Yes	Sep 19	–	1.999	1.654	40	40	10	20	+
30	1A	No	NS	NA	3.295	1.496	40	20	10	<10	+
36	2B	No	NS	–	1.419	NA	20	NA	20	NA	+
42	7A	No	NS	NA	0.576	NA	10	NA	20	NA	+
37	10A	No	NS	NA	1.115	NA	80	NA	80	NA	+
45	2A	No	NS	–	1.111	0.563	20	20	<10	<10	+

*First samples collected November 13, 2015; second samples collected March 22, 2015. Bldg, building; CoV, coronavirus; MERS, Middle East respiratory syndrome; NA, not available/not collected; NS, no signs/symptoms reported; ppNT, pseudoparticle neutralization test; $PRNT_{90}$, 90% plaque-reduction neutralization test; RT-PCR, reverse transcription PCR; +, positive; –, negative.
†Self-reported or observed signs/symptoms in the 14 d before epidemiologic interview.
‡According to World Health Organization criteria (http://www.who.int/csr/disease/coronavirus_infections/mers-laboratory-testing).
§Serologic test result was defined as positive if either $PRNT_{90}$ or ppNT titers were ≥20. S1 ELISA results are shown for information only; they were not used in designating infection status.

Table 3. Bivariate analyses of reported exposures to known MERS patient, including overall cohort, in study of MERS-CoV transmissibility in a closed setting Riyadh, Saudi Arabia, 2015*

Reported exposure	Case-patients, no. (%), n = 19	Non–case-patients, no. (%), n = 809	p value†	RR (95% CI)
Direct contact with known (symptomatic) MERS-CoV case-patient	11 (57.9)	43 (5.3)	<0.001	10.9 (6.7–17.6)
Shared bedroom with known case-patient	6 (31.6)	10 (1.2)	<0.001	25.5 (10.3–63.1)
Shared kitchen with known case-patient	4 (21.1)	11 (1.4)	<0.001	15.5 (5.4–44.2)
Shared bathroom with known case-patient	6 (31.6)	10 (1.2)	<0.001	25.5(10.3–63.1)
Shared meal with known case-patient	5 (26.3)	11 (1.4)	<0.001	19.4 (7.5–50.3)
Shared transportation to/from place of employment with known case-patient	5 (26.3)	18 (2.2)	<0.001	11.8 (4.9–28.5)
Reported nondirect contact with case-patient‡	4 (21.1)	11 (1.4)	<0.001	15.5 (5.4–44.2)

*CoV, coronavirus; MERS, Middle East respiratory syndrome; RR, risk ratio.
†By χ^2 test.
‡No physical contact, nonphysical contact (including talk to the known case-patient).

where persons with undiagnosed MERS had been cared for. In August 2015, hospital B, reportedly the primary occupation location for 2 women who were MERS-CoV positive according to PCR, was the location of a small cluster of laboratory-confirmed MERS cases (n = 5). Unfortunately, viral genetic sequencing was conducted on only 1 of those patients (*22*); without further epidemiologic and sequencing data from other patients in this cluster, or from the laboratory-confirmed patients in the small cluster in hospital B in August 2015, we cannot surmise further.

The time lag between identification of MERS patients in hospital B in August 2015 and the timing of this outbreak in October 2015 suggests that persons with subclinical cases may have been in or working in this hospital during August–October 2015; however, because testing for MERS-CoV in Saudi Arabia was substantial (*29*), missing symptomatic cases was unlikely. A subject of some debate and recent focus has been the potential role of mildly symptomatic or asymptomatic infections and possible environmental contamination in the spread of MERS-CoV in healthcare facilities (*22*,*30*–*33*). The rapid initiation of this investigation and use of an existing protocol (*34*) (developed for such use after the rapid isolation of close contacts regardless of the development of symptoms and the implementation of a no-fly policy among residents of the compound until the full 14-day follow-up was completed) probably limited further human-to-human transmission inside and potentially outside of Saudi Arabia.

Our study highlights the potential role of healthcare workers not responsible for direct patient care (e.g., hospital cleaners) in the spread of MERS-CoV. Often, hospital cleaning staff may be from other countries, may speak several languages, and may be missed by efforts to increase IPC specific to MERS-CoV. Specific MERS-CoV IPC training should be directed to cleaning staff in healthcare facilities, in addition to healthcare providers, in appropriate languages, particularly to protect them from infection and from facilitating virus spread within the healthcare facility.

For the 8 women with RT-PCR–confirmed infection, antibody titers ranged from 1:10 to 1:80 by PRNT and from 1:20 to 1:160 by ppNT. For 9 of the 19 women with confirmed evidence of infection by RT-PCR, serologic testing, or both, for whom follow-up serum samples were available 3 months after the putative exposure, 7 women had PRNT titers of <1:20 and 1 woman had ppNT titers of <1:20. Thus, the ppNT antibody test was somewhat more sensitive for detecting evidence of past infection. A ppNT titer of 1:20 is therefore an optimal indicator of past infection in seroepidemiologic assays. The ppNT, although more sensitive, correlated well with PRNT among persons with RT-PCR–confirmed MERS-CoV infection (*35*) and was uniformly negative in serum from persons in areas where MERS-CoV is not endemic (e.g., Hong Kong [*36*]). For this study, we categorized those without RT-PCR evidence of MERS-CoV infection but PRNT or ppNT antibody titers ≥1:20 as being MERS-CoV infected.

Of the 8 women who had RT-PCR–confirmed infection, 2 were asymptomatic, as were 6 of the 11 women whose diagnosis was made solely by serologic testing. Serologic studies of cohorts of patients positive for MERS-CoV by RT-PCR have shown that milder disease and asymptomatic infections may not be associated with detectable serologic responses (*37*). Thus, our serologic testing probably underestimates the true number of MERS-CoV infections that may have occurred. However, our data provide evidence that even asymptomatic infections can sometimes lead to detectable serologic responses and that such investigations are useful. Furthermore, the serologic results at 5 months after putative exposure show evidence of antibody titers waning to below diagnostic limits in some patients but also show that antibodies may remain detectable in others. This information is useful when interpreting seroepidemiologic studies in high-risk populations.

Our study had several limitations. Because of multicollinearity of the exposure variables (*38*), the accuracy of individual predictors may be compromised. The lack of collection of acute blood samples during the outbreak limited our ability to detect seroconversion. In addition, we were not able to conduct sequencing for patients of this outbreak and therefore were not able to use this information to potentially confirm that all 19 infected women acquired their infection from a common source or to identify the source of the outbreak.

The rapid initiation of contact tracing, isolation, and subsequent investigation probably contributed to the quick halt of human-to-human transmission in this outbreak. On the basis of the possible source of infection, to reduce secondary human-to-human transmission outside the occupational setting, our study indicates that IPC measures introduced in healthcare facilities should focus on not only healthcare personnel but also those working within the wider facility, including cleaners.

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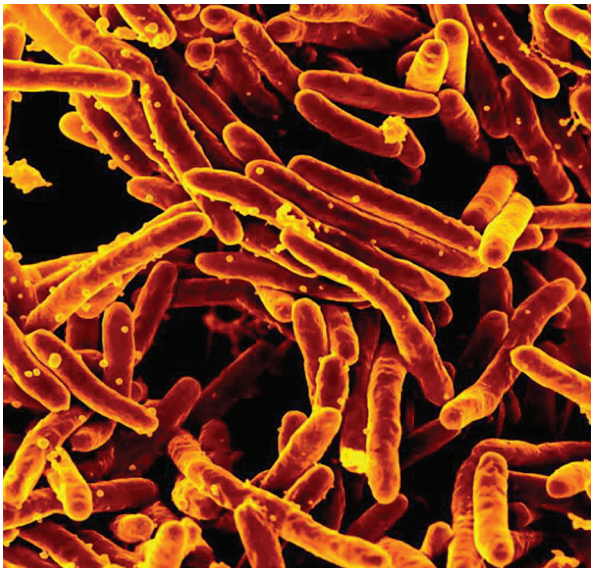
EID podcast

Tuberculosis Surveillance and Control in Puerto Rico



The WHO has recognized Puerto Rico as a promising candidate for the elimination of tuberculosis by 2035, but many challenges remain before this goal can be achieved. Before going forward, researchers must look back at the historical patterns and developments that have brought them here.

In this EID podcast, Dr. Emilio Dirlikov, a CDC epidemiologist, tells the story of TB surveillance in Puerto Rico from 1898 to 2015.

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EMERGING INFECTIOUS DISEASES®

Article DOI: https://doi.org/10.3201/eid2510.190130

Transmissibility of MERS-CoV Infection in a Closed Setting, Riyadh, Saudi Arabia, 2015

Appendix

Outbreak Investigation Questionnaire

The following questionnaire was administered in groups of 15 participants by a trained interviewer from the Ministry of Health or Institut Pasteur. The interviewer read each question aloud while the participants wrote their answers directly into the questionnaire.

MERS-CoV Outbreak Investigation Questionnaire

GENERAL INFORMATION

PANGKALAHATANG IMPORMASYON

1. Subject ID: ___ ___ ___ ___ ___ ___ ___ ___

Numero ng ID: ___ ___ ___ ___ ___ ___ ___ ___

2. Subject Name: First name _____ Surname_____

Panglan: _____ Apelyido: _____

3. **Date of interview (*dd/mm/yyyy*): ____/____/____**

Petsa ng pakikipanayam o interbyu (araw/buwan/taon) _____/_____/_____

4. **Location of Interview** (*Region*, *City*, *Province*):

_____

Lugar ng pakikipanayam (Rehiyon/Syudad/Probinsya):

_____

5. **Language used for interview:** ☐ English ☐ Filipino ☐ Other, please specify _____

Gamit na salita sa pakikipanayam: ☐ English ☐ Tagalog/Filipino ☐ At iba pa, (tukuyin)_____

6. **Gender (tick one):** ☐ Female ☐ Male

Kasarian (lagyan ng tsek ang isa): ☐Babae ☐ Lalake

7. **Place of primary residence of subject (address):**

_____

Lugar ng pangunahing paninirahan ng paksa/pasyente (address):

_____

8. How long have you lived in this complex? _____ months _____ year

Gaano katagal ka ng nanirahan sa complex na ito: _____buwan _____ taon

9. **Date of birth:** ____/____/_____ (mm/dd/yyyy)

Petsa ng kapanganakan: _____/_____/_____ (buwan/araw/taon)

10. **What is your current marital status?** ☐ Single ☐ Married ☐ Divorce ☐ Widowed

Ano ang iyong kasalukuyang katayuan civil? ☐ Single ☐ Kasal ☐ Diborsyado/Dibosyada ☐ Byudo/byuda

a. If you are married, does your husband live in KSA? ☐ Yes ☐ No

Kung ikaw ay may-asawa, ang iyong asawa ay nakatira sa KSA? ☐ Oo ☐ Hindi

b. If yes, where does he live? (location, city province) _____

Kung Oo, saan siya nakatira? (lokasyon, syudad/probinsya) _____

c. If yes, how often do you visit your husband? ☐ More than once a week ☐ once a week ☐ once a month

Kung oo, gaano kadalas mo bisitahin ang iyong asawa? ☐ Higit sa isang beses sa isang lingo

☐minsan sa isang lingo

☐minsan sa isang buwan

11. What is your nationality? ☐ Filipino ☐ Indian ☐ Indonesian ☐ Sri Lankan ☐ Other _____

Ano ang iyong nasyonalidad? ☐ Filipino ☐ Indian ☐ Indonesian ☐ Sri Lankan ☐ At iba pa: _____

12. How long have you been living in Saudi Arabia? _____

Gaano katagal ka na naninirahan sa Saudi Arabia? _____

HOUSING EXPOSURES

13. What building do you live in ? _____

Anong building ang iyong tinitirhan? _____

14. What floor do you live on? ☐ Ground floor ☐ First floor ☐ Second floor

Sa anong floor ka nakatira? ☐ Palapag ☐Unang palapag ☐Pangalawang palapag

15. How many women live in your villa with you in total? _____ total

Gaano karaming mga kababaihan ang nakatira sa inyong villa? _____(lahat)

i. **Ground floor: _____** Palapag: _____

ii. **First floor: _____** Unang palapag:_____

iii. **Second floor: _____** Pangalawang palapag: _____

16. What is your bedroom number? ☐ One ☐ Two ☐ Three

Ano ang iyong bedroom number? ☐ Una/Isa ☐Panglawa/Dalawa ☐ Pangatlo/Tatlo

17. How many women share the bedroom with you? _____ women

Gaano karaming mga kababaihan kasama/kabahagi mo sa kwarto? _____babae

18. Do you have a bottom or top bunk? ☐ Top ☐ Bottom

Mayroon ba kayong isang ibaba o itaas bunk? ☐ Itaas ☐ Ibaba

18.1 Do you have a personal electronic fan in your bed space? ☐ Yes ☐ No

Mayroon ba kayong isang personal na elektronikong fan sa iyong kwarto? ☐ Meron ☐ Wala

18.2 Do you use a curtain on your bunk bed? ☐ Yes ☐ No

Gumagamit ka ba ng isang kurtina sa iyong bunk bed? ☐ Oo ☐ Hindi

19. Is there a window in your bedroom? ☐ Yes ☐ No

Mayroon bang bintana sa iyong kwarto? ☐ Meron ☐ Wala

19.1 f yes, is this window covered? ☐ Yes ☐ No

Kung Oo, may takip ba ang bintana na ito? ☐ Meron ☐ Wala

20. Is there a working air conditioner in your bedroom? ☐ Yes ☐ No

Mayroon bang gumaganang air conditioner sa iyong kwarto? ☐ Meron ☐ Wala

21. How many bathrooms are on your floor? ☐ 1 ☐ 2 ☐ 3

Ilan ang mga banyo sa iyong palapag(floor)? ☐ 1 ☐ 2 ☐ 3

21.1 How many women share your bathroom? _____ women ☐ Unknown

Gaano karaming mga babae ang gumagamit ng iyong banyo? _____babae

22. Is there a kitchen on your floor? ☐ Yes ☐ No

Mayroon bang isang kusina sa iyong palapag? ☐ Meron ☐ Wala

22.1 If not, which kitchen(s) do you use (check all that apply)?

☐ Ground floor ☐ First floor ☐ Second Floor

Kung wala, alin or saan (mga) kitchen ang iyong ginagamit (i-check ang lahat ng naaangkop)?

☐ Palapag ☐ Unang palapag ☐ Pangalawang palapag

22.2 How many women share the kitchen you use? _____ women ☐ Unknown

Gaano karaming mga babae ang gumagamit ng iyong kusina? _____

22.3 Where is your refrigerator? ☐Bedroom ☐Kitchen ☐both Bedroom and Kitchen

Saan ang iyong refrigerator? ☐Silid Tulugan ☐Kusina ☐Pareho Silid tulugan at Kusina

23. Is there a washing machine on your floor? ☐ Yes ☐ No

Mayroon bang isang washing machine sa iyong palapag? ☐ Meron ☐ Wala

23.1 Do you use the washing machine to clean your clothes? ☐ Yes ☐ No

Ginagamit mo ba ang washing machine upang linisin ang iyong mga damit?☐ Oo ☐ Hindi

23.2 If not, which washing machine do you use? ☐ Ground floor☐ First floor ☐ Second floor ☐ Don't use washing machine

Kung Hindi, ano o saan ang washing machine ang ginagamit mo? ☐ Palapag ☐ Unang Palapag ☐ Pangalawang palapag ☐ Hindi gumagamit ng washing machine

23.3 How many women share the washing machine you use? _____ women

Gaano karaming mga babae ang kashare mo sa ginagamit mong washing machine? _____babae

24. Have you seen other animals or pests at your home? ☐ YES ☐ NO

Mayroon bang mga hayop o mga peste sa iyong bahay? ☐ Meron ☐ Wala

24.1If yes, which other animals have you seen in or around your home? ☐ Cats ☐ Dogs ☐ Rats ☐ Mice ☐ Bats ☐ Cockroaches ☐ Other _____

Kung Meron, anong mga hayop ang makikita sa paligid ng iyong bahay?

☐ Pusa ☐ Aso ☐ Daga ☐ Bubwit ☐ Paniki ☐ Ipis ☐ At iba pa:_____

25. Did you attend any social gatherings within the residential complex in the last two months? ☐ Yes ☐ No

Ikaw ba ay dumalo o nakadalo sa anumang social na pagtitipon sa loob ng residential complex nyo sa huling dalawang buwan? ☐ Oo ☐ Hindi

25.1.If yes, what was the gathering for (e.g., EID)(add some answers plus an other with open ended)

Kung Oo, ano or para saan ang pagtitipon na iyon? (magdagdag ng ilang mga sagot kasama ang isa pa or mga event na di pa natapos)
Gathering 1: (description) _____ Number of women attending (estimate): _____
Pagtitipon 1: (isalarawan) _____ Bilang ng mga kababaihan na dumalo o dadalo_____
Gathering 2: (description) _____ Number of women attending (estimate): _____
Pagtitipon 2: (isalarawan) _____ Bilang ng mga kababaihan na dumalo o dadalo_____

26. Do you socialize with the women in your villa? ☐ Yes ☐ No

Ikaw ba ay nakikisalamuha sa mga babae sa iyong villa? ☐ Oo ☐ Hindi

26.1.If yes, what socialization do you do?

☐Watch TV/movies/you tube together on a shared laptop/computer ☐play volleyball
☐Attend parties ☐share meals ☐sing songs
☐Other _____

Kung Oo, anong klase ng kaganapan or pagtitipon ang ginagawa mo?

☐ Magkasama sa panonood ng TV / pelikula / Youtube sa isang laptop / computer
☐Dumalo sa mga party ☐Magkasalo sa pagkain ☐Kumanta /Kantahan
☐ At iba pa:

27. Did you attend any social gathering last month? ☐ Yes ☐ No

Dumalo ka ba ng anumang mga pagtitipon noong nakaraang buwan? ☐ Oo ☐ Hind

27.1 If yes when? _____ Kung Oo, kalian? _____

27.2 What was the nature of the social gathering? _____

Ano ang klase ng pagtitipon? _____

CONTACTS

28. Have you had any contact with a known or suspected MERS-CoV patient? ☐ Yes ☐ No

Ikaw ba ay nagkaroon ng anumang contact sa isang kilala o pinaghihinalaang mga pasyente MERS-CoV? ☐ Oo ☐ Hindi

28.1 If yes, who did you come in contact with? (name)_____

Kung Oo, sino ito? (ibigay ang pangalan) _____

28.2 yes, what was the nature of the contact (choose all that apply)

☐Shared a bedroom ☐shared a kitchen ☐shared a bathroom ☐shared a meal

☐shared transportation to or from work

☐had direct contact with patient (e.g., hugged, touched patient)

☐had no direct contact but spoke to patient (within 3 feet)….

☐ Other_____

Kung Oo, ano o paano kayo nagkaroon ng contact (piliin ang lahat na naaangkop)

☐ Magkasama or share ng isang kwarto ☐ Magkashare ng kusina

☐ Magkashare ng banyo ☐ Magkashare ng pagkain

☐ Magkashare ng sasakyan papunta at pauwi ng trabaho

☐ nagkaroon ng direktang kontak sa mga pasyente (eg, niyakap, hinawakan pasyente)

☐walang direktang kontact ngunit nakipag ugap sa pasyente (sa loob ng 3 talampakan)

☐ At iba pa _____

29 Have you had contact with a roommate or housemate with respiratory, gastrointestinal symptoms or fever in the last 4 weeks? ☐ Yes ☐ No

29.1 If yes, who did you have contact with? (list)

Contact 1:_____

Contact 2:_____

Contact 3:_____

Contact 4:_____

(add more if necessary)

Nagkaroon ng kontak sa isang kasama sa kuwarto o kasambahay na may sakit sa paghinga, Gastrointestinal sintomas o lagnat sa huling 4 na linggo? ☐ Oo ☐ Hindi

Kung Oo, sino or kani-kanino ka nakipag-ugnayan? (listahan)

Contact 1:_____

Contact 2:_____

Contact 3:_____

Contact 4:_____

(add more if necessary)

OCCUPATIONAL EXPOSURES

30 Where do you work? _____

Saan ka nagtatrabaho? _____

31 What building are you working in? _____

Ano ang pangalan ng gusali o lokasyon na pinagtatrabahuhan mo?

_____

32 If working in Princess Nora University, do you have contact with any students or faculty? ☐ Yes ☐ No

Kung ikaw ay nagtatrabaho sa Princess Nora University, Mayroon ba kayong ka-ugnayan sa anumang

mga mag-aaral o mga kasapi na guro? ☐Oo ☐ hindi

32.1 If yes, were any of these students/faculty members sick in the last two weeks? ☐ Yes ☐ No

Kung Oo, meron ba sa alinman nitong mga mag-aaral o kasaping mga guro ay may sakit sa huling

dalawang linggo? ☐Oo ☐ hindi

33 Where is your current primary employment? _____

33.1 How long have you worked at this location? ___ ___ Years___ ___ Months

33.2 What is the address of your work? _____

Saan ang iyong kasalukuyang pangunahing trabaho? _____

Gaano ka na katagal nagtrabaho sa lokasyon na ito? _____ taon_____buwan

Ano ang address ng iyong trabaho? _____

34 What is/are your job/jobs at this location? (tick all that apply)

☐ Technician ☐ Cleaning ☐ Engineer ☐ Other _____

34.1 Of the listed options, which you selected, which is your primary job?

_____

Ano ang / iyong mga trabaho / sa lokasyon na ito? (lagyan ng tsek ang lahat ng naaangkop)

☐Tekniko ☐ Paglilinis ☐Engineer ☐ At iba pa _____

Sa mga nakalista pagpipilian, na kung saan na iyong pinili, ano sa mga ito ang iyong pangunahing trabaho? _____

35 How often in the week do you work at this location?

Day Working? Hour start Hour end

Monday ☐ YES _____ _____

Tuesday ☐ YES _____ _____

Wednesday ☐ YES _____ _____

Thursday ☐ YES _____ _____

Friday ☐ YES _____ _____

Saturday ☐ YES _____ _____

Sunday ☐ YES _____ _____

Gaano kadalas sa isang linggo ka nagtatrabaho sa lokasyon na ito?

Araw Nagtatrabaho? Umpisa ng trabaho Tapos ng Trabaho

Lunes ☐ Oo _____ _____

Martes ☐ Oo _____ _____

Miyerkules ☐ Oo _____ _____

Huwebes ☐ Oo _____ _____

Biyernes ☐ Oo _____ _____

Sabado ☐ Oo _____ _____

Linggo ☐ Oo _____ _____

36 If you hold only one job, what do you do in the evenings after 14:00 or 15:00 until you go to sleep?_____

Kung ikaw ay mayroon lamang isang trabaho, ano ang ginagawa mo sa gabi sa pagitan ng 14:00 o 15:00? _____

37 **How frequent do you go for shopping?**

_____

Gaano ka kadalas pumunta para sa pamimili?_____

37.1 When was the last time (date) that you went for shopping?_____

Kailan (petsa) ka huling nagpunta para sa pamimili?_____

37.2 Where did you do your last shopping?_____

Saan ka huling namili?_____

38 Do you usually play volleyball with other sisters in the compound?_____

Ikaw ba ay karaniwang naglalaro ng volleyball kasama ng iba pang mga babae sa compound?

_____

38.1 When was the last time you played volleyball with other sisters in the compound?

_____

Kailan ka huling naglaro ng volleyball kasama ng iba pang mga babae sa compound?

_____

39 Do you usually watch TV with roommates/ housemates in the compound?

_____

Ikaw ba ay karaniwang nanonood ng TV kasama ng iyong mga roommate / kasambahay sa compound? _____

39.1 If yes, when was the last time you watched TV with roommates/ housemates in the compound?_____

Kung Oo, kalian ang huling panahon na nanood ka ng TV kasama ng iyong mga roommate / kasambahay sa compound? _____

40 What personal protective equipment do you usually wear when working at your primary job?

☐ No protective equipment used ☐ Gloves ☐ Coveralls

☐ Dust masks ☐ Boots or boot covers ☐ Respirators

☐ Eye protection (goggles, safety glasses) ☐ Others:_____

Ano ang mga personal na proteksiyon kagamitan at karaniwang iyong isinusuot kapag nagtatrabaho sa iyong pangunahing trabaho?

☐ Walang kagamitang pangprotekcyonna ginamit ☐ Guwantes

☐ Coveralls ☐ Dust masks ☐ Bota ☐ Respirators

☐ Proteksyon sa mata (goggles) ☐ At Iba pa: _____

41 How often do you usually wash your hands while working at your primary job (check all) ☐ At mealtimes ☐ Before and after each animal related task

☐ At bathroom times ☐ The beginning and end of the day ☐ Rarely

Gaano kadalas ka kadalasang naghuhugas ng inyong mga kamay habang nagtatrabaho sa iyong pangunahing trabaho (i-check ang lahat)

☐ sa oras ng kainan ☐ Bago at pagkatapos ng bawat gawain na may kaugnayan sa hayop

☐ sa oras ng pagba banyo ☐ Sa pag simula at pagtatapos ng araw ☐ Madalang

ANIMAL EXPOSURES IN/AROUND THE HOME where you live

42. Were any animals (e.g. camels, sheep, goats, cattle, horses, cats, dogs, birds) kept in or around your home in the last six months? ☐ YES ☐ NO ☐ UNKNOWN

Mayroon bang mga hayop (eg kamelyo, tupa, kambing, baka, kabayo, pusa, aso, ibon) sa inyong paligid ng iyong tahanan sa huling anim na buwan? ☐ Meron ☐ Wala ☐ Di Alam

42.2 Which animals?

☐ kamelyo ☐ tupa ☐ kambing ☐ baka ☐ kabayo ☐ pusa ☐ aso, ☐ bon

43. In the last six months, did you have any contact with any carcasses, body fluids, secretions, urine or excrement of camels in or around your home? ☐ YES ☐ NO ☐ UNKNOWN

Sa huling anim na buwan, ikaw ba ay mayroon anumang contact sa mga bangkay, likido sa katawan, secretions, ihi o dumi ng kamelyo sa o sa paligid ng iyong bahay? ☐ Meron ☐ Wala ☐ Di Alam

44. In the last six months, did you have any contact with any camel bedding, stray of feed in or around your home? ☐ YES ☐ NO ☐ UNKNOWN

Sa huling anim na buwan, ikaw ba ay mayroon anumang contact sa mga gamit ng kamelyo (tulugan), o nagkalat/nagbigay ng kanilang mga pagkain sa paligid ng iyong bahay? ☐ Oo ☐ Hindi ☐ Di Alam

45. Do others living in your household (e.g., domestic help or relative) frequently visit or work on a farm or market where camels are kept or sold? ☐ YES ☐ NO ☐ UNKNOWN

Mayroon ba sa ibang nakatira sa inyong sambayan (eg, domestic helper/ka tulong o kamag-anak) ang madalas bumisita o nagtatrabaho sa isang sakahan o pamilihan kung saan nagbebenta ng kamelyo? ☐ Meron ☐ Wala ☐ Di Alam

46. **Have others living in your household (e.g., domestic help or relative) had visited or worked in the in the past 2 weeks at a farm or market where camels are kept or sold? ☐ YES ☐ NO ☐ UNKNOWN**

    Sa ibang nakatira sa inyong sambahayan (eg, domestic helper/ka tulong o kamag-anak) bumisita ba sila o nagtrabaho sa isang sakahan o pamilihan ng kamelyo sa huling dalawang (2) lingo? ☐ Oo ☐ Hindi ☐ Di Alam

47. **Have others living in your household (e.g., domestic help or relative) had direct contact with camels in the past 2 weeks?** ☐ YES ☐ NO ☐ UNKNOWN

    Sa ibang nakatira sa inyong sambahayan (eg, domestic helper/ka tulong o kamag-anak) nagkaroon ba ng direktang kontak sa mga kamelyo sa nakaraan 2 linggo? ☐ Oo ☐ Hindi ☐ Di Alam

FOOD EXPOSURES

The following series of questions are focused on food exposures in the last month

Ang mga sumusunod na serye ng mga katanungan ay nakatutok sa mga exposure ng pagkain sa nakaraang buwan

During the past six months, how often on average did you consume any of the following products:

Sa panahon ng nakaraang anim na buwan, gaano kadalas sa average na ubusin mo ang alinman sa mga sumusunod na produkto

48. **Did you drink unpasteurized camel milk? ☐ YES ☐ NO ☐ UNKNOWN**

    Uminom ka ba unpasteurized kamelyo gatas? ☐ Oo ☐ Hindi ☐ Di Alam

49. **Did you use camel urine, for example, for medicinal purposes? ☐YES ☐ NO ☐ UNKNOWN**

Sa layunin ng panggagamot, gumamit ka ba ng ihi ng kamelyo? ☐ Oo ☐ Hindi ☐ Di Alam

50. **Did you drink camel urine? ☐YES ☐ NO ☐ UNKNOWN**

    Uminom ka ba ng ihin ng kamelyo? ☐ Oo ☐ Hindi ☐ Di Alam

TRAVEL HISTORY AND EXPOSURES

51. **During the last 2 months have you travelled outside KSA? ☐ YES ☐ NO ☐ UNKNOWN**

Sa panahon ng huling 2 buwan ikaw ba ay nakapaglakbay sa labas KSA? ☐ Oo ☐ Hindi ☐ Di Alam

51.1 If yes, what countries/regions have you visited?

Country Region/City Approximate Dates

_____ _____ _____
_____ _____ _____
_____ _____ _____
_____ _____ _____
_____ _____ _____

Kung oo, ano mga bansa / rehiyon ang iyong mong binisita?

Bansa Rehiyon/Syudad Petsa

_____ _____ _____
_____ _____ _____
_____ _____ _____
_____ _____ _____

_____ _____ _____

52. While traveling, have you attended any mass gatherings (e.g., weddings, festivals or religious pilgrimages) outside KSA where there were large numbers of people together? ☐ YES ☐ NO ☐ UNKNOWN

52.1 If yes, specify event(s) and location:

_____

Sa pahanon ng iyong naglalakbay, pumasok o dumalo kaba sa anumang malakihang pagtitipon (halimbawa, weddings, festival o pilgrimages relihiyon) sa labas ng KSA kung saan mayroong malaking bilang ng mga tao na magkasama? ☐ Oo ☐ Hindi ☐ Di Alam

Kung Oo, tukuyin ang (mga) kaganapan at lokasyon:

_____

53. When you travelled, did you have direct or indirect contact with dromedary camels while outside of KSA? ☐ YES ☐ NO ☐ UNKNOWN

54. In the last month, have you visit any health care facility outside of KSA? ☐ YES ☐ NO ☐ UNKNOWN

54.1 If yes, where (city, country, hospital name) _____

Sa mga nakaraang buwan, ikaw ba ay bumisita sa anumang health care facility sa labas ng KSA?
☐ Oo ☐ Hindi ☐ Di Alam
Kung oo, saan (Syudad, Bansa, pangalan ng ospital) _____

SIGNS AND SYMPTOMS

Palatandaan at Sintomas

55. Are you sick today with fever and/or cough? ☐ YES ☐ NO

a. If yes, when did your symptoms start (DD/MM/YYYY): ____/___/_____

Ikaw ay may sakit ngayon at may lagnat at / o pag-ubo? ☐ Oo ☐ Hindi

Kung Oo, kailan nagsimula ang iyong mga sintomas (petsa: araw/buwan/taon):____/____/___

56. Did you experience any respiratory signs or symptoms during the last four weeks?

☐ YES ☐ NO ☐ UNKNOWN

If yes, when did these symptoms start (DD/MM/YYYY): ____/___/_____

Nakaranas ka ba ng anumang respiratory (sakit sa paghinga) na palatandaan o sintomas sa loob ng huling apat na linggo? ☐ Oo ☐ Hindi ☐ Di Alam

Kung Oo, kailan nagsimula ang mga sintomas na ito (petsa: araw/buwan/taon):____/____/____

57. If you answered yes to either #1 or #2, please indicate which symptoms:

Symptom Today Last 4 weeks

Dry Cough ☐ YES ☐ NO ☐ UNKNOWN ☐ YES ☐ NO ☐ UNKNOWN

Productive Cough ☐ YES ☐ NO ☐ UNKNOWN ☐ YES ☐ NO ☐ UNKNOWN

Phlegm ☐ YES ☐ NO ☐ UNKNOWN ☐ YES ☐ NO ☐ UNKNOWN

Runny nose ☐ YES ☐ NO ☐ UNKNOWN ☐ YES ☐ NO ☐ UNKNOWN

Sore throat ☐ YES ☐ NO ☐ UNKNOWN ☐ YES ☐ NO ☐ UNKNOWN

Fever ☐ YES ☐ NO ☐ UNKNOWN ☐ YES ☐ NO ☐ UNKNOWN

Shortness of breath ☐ YES ☐ NO ☐ UNKNOWN ☐ YES ☐ NO ☐ UNKNOWN

Muscle pain ☐ YES ☐ NO ☐ UNKNOWN ☐ YES ☐ NO ☐ UNKNOWN

Diarrhea ☐ YES ☐ NO ☐ UNKNOWN ☐ YES ☐ NO ☐ UNKNOWN

Chest Pain ☐ YES ☐ NO ☐ UNKNOWN ☐ YES ☐ NO ☐ UNKNOWN

Vomiting ☐ YES ☐ NO ☐ UNKNOWN ☐ YES ☐ NO ☐ UNKNOWN

Rashes ☐ YES ☐ NO ☐ UNKNOWN ☐ YES ☐ NO ☐ UNKNOWN

Kung sumagot ka ng Oo sa alinman sa # 1 o # 2, mangyaring ipahiwatig kung aling mga sintomas:

Sintomas Kasalukuyang Araw (Today) Huling 4 na Linggo (Last 4 weeks)

Tuyong Ubo ☐ OO ☐ HINDI☐ DI MATUKOY ☐ OO ☐ HINDI☐ DI MATUKOY

Produktibong ubo ☐ OO ☐ HINDI☐ DI MATUKOY ☐ OO ☐ HINDI☐ DI MATUKOY

Plema ☐ OO☐ HINDI☐ DI MATUKOY ☐ OO ☐ HINDI☐ DI MATUKOY

Sinisipon ☐ OO☐ HINDI☐ DI MATUKOY ☐ OO ☐ HINDI☐ DI MATUKOY

Namamagang lalamunan ☐ OO☐ HINDI☐ DI MATUKOY ☐ OO ☐ HINDI☐ DI MATUKOY

Lagnat ☐ OO ☐ HINDI☐ DI MATUKOY ☐ OO ☐ HINDI☐ DI MATUKOY

Pangangapos ng hininga ☐ OO ☐ HINDI☐ DI MATUKOY ☐ OO ☐ HINDI☐ DI MATUKOY

Pananakit ng kalamnan ☐ OO ☐ HINDI☐ DI MATUKOY ☐ OO ☐ HINDI☐ DI MATUKOY

Pagtatae ☐ OO ☐ HINDI☐ DI MATUKOY ☐ OO ☐ HINDI☐ DI MATUKOY

Pananakit ng dibdib ☐ OO ☐ HINDI☐ DI MATUKOY ☐ OO ☐ HINDI☐ DI MATUKOY

Pagsusuka ☐ OO ☐ HINDI☐ DI MATUKOY ☐ OO ☐ HINDI☐ DI MATUKOY

Pamamantal ☐ OO ☐ HINDI☐ DI MATUKOY ☐ OO ☐ HINDI☐ DI MATUKOY

58. Did you seek medical care? ☐ YES ☐ NO ☐ UNKNOWN

If yes, where did you seek medical care (name and address of medical facility)?

_____

If yes, when did you seek medical care (DD/MM/YYYY): ____/___/_____

Ikaw ba ang kumonsulta sa manggagamot? ☐ OO ☐ HINDI☐ DI MATUKOY

Kung Oo, saang ospital ka nagpakonsulta? (pangalan at address ng mga medikal na pasilidad)?

_____

Kung Oo, kailan ka nagpakonsulta? (petsa: araw/buwan/taon): ____/___/_____

59. Where you hospitalized during the course of your illness? ☐ YES ☐ NO ☐ UNKNOWN

59.1 If yes, when were you hospitalized (DD/MM/YYYY): ____/___/_____

59.2 If yes, which hospital did you receive treatment(s)? (name and address)

_____

Ikaw pa ay na-ospital sa mga panahon ng iyong pagkaskasakit? ☐ OO ☐ HINDI☐ DI MATUKOY

Kung Oo, kelan ka na-ospital (petsa: araw/buwan/taon): ____/___/_____

Kung Oo, saan o anong ospital ka nakatanggap ng (mga) paggamot? (pangalan at address ng ospital) _____

MEDICAL HISTORY AND RELATED EXPOSURES

KASAYSAYAN MEDIKAL AT MGA KAUGNAY NA PAGKAKALANTAD

60. Do you currently smoke tobacco (ex. cigarettes, cigars, shisha)?
☐ Daily ☐ Less than daily ☐ Not at all ☐ Unknown
Ikaw ba sa kasalukuyan ay nagsisigarilyo (nagtatabako)? (ex. Sigarilyo, tabako, shisha)?
☐ Araw-araw ☐ Madalang sa araw-araw ☐ Hindi ☐ Di Matukoy

61. Do you share the same cigarette, cigar, shisha? ☐ YES ☐ NO ☐ UNKNOWN
Ikaw ba ay nakikibahagi ng parehong sigarilyo, cigar, shisha? ☐ OO ☐ HINDI☐ DI MATUKOY

62. Have you smoked tobacco daily in the past? ☐ YES ☐ NO ☐ UNKNOWN

Ikaw ba ay nagsisigarilyo ng tabako araw-araw sa mga panahong nakalipas ? ☐ OO ☐ HINDI ☐ DI MATUKOY

63. Is there any hereditary disease running in your family? ☐ YES ☐ NO ☐ UNKNOWN

63.1 If yes, please specify the disease(s):
_____

Mayroon ba sa iyong pamilya ang anumang mga sakit na namamana? ☐ OO ☐ HINDI ☐ DI MATUKOY

Kung Oo, mangyaring tukuyin ang (mga) sakit: _____

64. Do you currently have any chronic illness (ex. asthma, cancer, diabetes)? ☐ YES ☐ NO ☐ UNKNOWN

64.1 If yes, please specify the disease(s): _____

Sa kasalukuyan mayroon ka bang anumang mga hindi gumagaling na sakit (ex. Hika, kanser, diabetes)? ☐ OO ☐ HINDI☐ DI MATUKOY

Kung Oo, mangyaring tukuyin ang (mga) sakit: _____

65. Have you taken medications regularly in the last six months? ☐ YES ☐ NO ☐ UNKNOWN

65.1 If yes, what medications do you regularly take? (list all)

_____

_____

Ikaw ba ay may mga gamot na regular na iniinom sa huling anim na buwan? ☐ OO ☐ HINDI ☐ DI MATUKOY

Kung Oo, anong gamot ang regular mong iniinom? (ilista ang lahat)

_____

_____

66. Have you taken any traditional medications in the last six months? ☐ YES ☐ NO ☐ UNKNOWN

If yes, which traditional medications (list all)

_____

_____

Ikaw ba ay may iniinom na anumang tradisyonal na mga gamot sa huling anim na buwan? ☐ OO ☐ HINDI ☐ DI MATUKOY

Kung Oo, anong tradisyunal na gamot? (ilista ang lahat)

_____

_____

67. What is your height _____ cm Ano ang iyong taas _____ cm

68. What is your weight _____.____ kg Ano ang iyong timbang _____._____kg

69. How many bars of soap to you use per month? _____

Gaano karaming mga bar ng sabon ang nagagamit mo sa bawat buwan? _____

70. How frequently do you bathe? _____ per day/per week

Gaano ka kadalas maligo? _____ beses isang araw/ isang lingo

71. What is the highest level of education? ☐ Primary school ☐ High School ☐ University ☐ Post Graduate degree

Ano ang pinakamataas na antas ng iyong edukasyon? ☐ Mababang Paaralan ☐ Mataas na paaralan ☐ Unibersidad ☐ Post Graduate degree

72. Have you visited anyone in the hospital in the last 2 months? ☐ YES ☐ NO ☐ UNKNOWN

If yes, was the person sick with respiratory illness (cough, breathing problems)? ☐ YES ☐ NO ☐ UNKNOWN

72.1 If yes, at what hospital (regions, city, district)_____

72.2 If yes, what was your relationship to the person in the hospital? ☐ Close family ☐ Extended family ☐ Friend ☐ Other_____

Ikaw ba ay mayroong sinumang binisita sa ospital sa huling 2 buwan? ☐ OO ☐ HINDI☐ DI MATUKOY

Kung Oo, ang taong ito ba ay may sakit paghinga/respiratory (tulad ng ubo, at iba pang mga problema sa paghinga)? ☐ OO ☐ HINDI☐ DI MATUKOY

Kung Oo, saan o anong ospital (mga rehiyon, lungsod, distrito) _____

Kung oo, ano ang iyong relasyon sa taong nasa ospital? ☐ Malapit na kamag-anak ☐ Extended family ☐ Kaibigan ☐ At iba pa_____

73. **Had you heard of MERS Coronavirus before this outbreak?** ☐ YES ☐ NO

73.1 If yes, what was the source of your information? ☐ Ministry of Health ☐ TV ☐ Supervisor ☐ Other _____

Mayroon ka bang napapakinggan tungkol sa MERS Coronavirus noon pa man bago pa ito naging outbreak? ☐ OO ☐ HINDI

Kung Oo, saan o ano ang pinagmulan ng iyong impormasyon? ☐ Ministry of Health ☐ TV ☐ Supervisor ☐ Other _____

74. In the last month, how many times have you been visited by a health care professional about MERS-CoV?_____

74.1 How many times have samples been collected from you? _____

74.2 What samples were collected? ☐ NP ☐OP ☐Blood ☐other_____

74.3 What dates were samples collected from you?

Sa nakaraang buwan, ilang beses ka na binisita ng isang propesyonal ng pangkalusugang pag-aalaga tungkol sa MERS-CoV? _____

Ilang beses na samples na nakolekta mula sa iyo? _____

Anong sample ang nakolekta sa iyo? ☐ NP ☐OP ☐Blood ☐At iba pa_____

Anong petsa ang sample na nakolekta mula sa iyo? _____

75 May we contact you again with follow up questions or clarifications? ☐ YES ☐ NO

Telephone number of subject:

_____

Maari ba kaming makipag-ugnayan muli sa iyo para sa susunod pang mga katanungan o paglilinaw? ☐ OO ☐ HINDI Numero ng telepono: _____

The following questionnaire was administered individually to participants by a trained interviewer from the Ministry of Health or Institut Pasteur. The interviewer read each question aloud and recorded the participants answers directly into the questionnaire.

Outbreak Investigation Questionnaire

GENERAL INFORMATION

PANGKALAHATANG IMPORMASYON

1. Subject ID: ___ ___ ___ ___ ___ ___ ___ ___

Numero ng ID: ___ ___ ___ ___ ___ ___ ___ ___

2. Subject Name: First name _____ Surname_____

Panglan: _____ Apelyido: _____

SECONDARY JOB

3. Do you hold other jobs aside from your primary job? ☐ YES ☐ NO

3.1. If yes, what is/are your other job(s)? _____

3.2. If yes, where is this other job? _____

3.3. If yes, how often in the week do you work at this second location?

4. Day Working? Hour start Hour end

Monday ☐ YES _____ _____

Tuesday ☐ YES _____ _____

Wednesday ☐ YES _____ _____

Thursday ☐ YES _____ _____

Friday ☐ YES _____ _____

Saturday ☐ YES _____ _____

Sunday ☐ YES _____ _____

Ikaw ba ay may iba pang trabaho sa ibang lugar maliban sa lokasyon na ito? ☐ Meron ☐ Wala

Kung oo, ano ang / iyong (mga) iba pang mga trabaho?_____

Kung oo, gaano kadalas sa isang linggo ka nagtatrabaho dito sa pangalawang lokasyon?

Araw Nagtatrabaho? Umpisa ng trabaho Tapos ng Trabaho

Lunes ☐ Oo _____ _____

Martes ☐ Oo _____ _____

Miyerkules ☐ Oo _____ _____

Huwebes ☐ Oo _____ _____

Biyernes ☐ Oo _____ _____

Sabado ☐ Oo _____ _____

Linggo ☐ Oo _____ _____

5. If the second location is a health care facility:

5.1. What is the name of the health care facility in which you work? _____

5.2. What is the location of the health care facility in which you work? _____

5.3. Where in the health care facility do you work? _____

5.4. What/which department(s) in this health care facility do you work?
_____

5.5. Do you have any contact with biological specimens during your work? ☐ Yes ☐ No ☐Unknown

5.6. Do you handle soiled patient linens during your work? ☐ Yes ☐ No ☐Unknown

5.7. Have you worked in a room where there was a MERS-CoV patients? ☐ Yes ☐ No ☐Unknown

Kung ang pangalawang lokasyon/trabaho ay isang pasilidad ng pangangalagang pangkalusugan:

Ano ang pangalan ng pangangalagang pangkalusugan (health care facility) kung saan ka nagtatrabaho: _____

Ano ang lokasyon ng pangkalusugang pag-aalaga pasilidad kung saan ka nagtatrabaho
_____

Saan sa mga pasilidad ng pangangalagang pangkalusugan ka nagtatrabaho?

_____

Ano, o sa aling (mga) departamento ng pasilidad na ito sa pangangalaga ng kalusugan ka nagta trabaho?_____

Mayroon ka bang anumang mga contact sa mga biological ispesimen sa panahon ng iyong trabaho? _____ ☐ Meron ☐ Wala ☐ Di Alam

Humahawak ka ba ng maruming gamit ng pasyente tulad ng linens sa panahon ng iyong trabaho? ☐ Oo ☐ Hindi ☐ Di Alam

Ikaw ba ay nakapagtrabaho sa isang silid kung saan nagkaroon ng mga pasyenteng may MERS-CoV? ☐ Oo ☐ Hindi ☐ Di Alam

6. In the last 6 weeks, have you worked in a health care facility? ☐ Yes ☐ No

6.1. What is the name of the health care facility in which you worked? _____

6.2. What is the location of the health care facility in which you worked? _____

6.3. Where in the health care facility did you work? _____

6.4. What/which department(s) in this health care facility did you work?_____

6.5. Did you have any contact with biological specimens during your work? ☐ Yes ☐ No ☐Unknown

6.6. Did you handle soiled patient linens during your work? ☐ Yes ☐ No ☐Unknown

6.7. Did you work in a room where there was a MERS-CoV patients? ☐ Yes ☐ No ☐Unknown

Sa huling 6 na linggo, ikaw aba y nagtrabaho sa isang pasilidad ng pangangalaga ng kalusugan? ☐ Oo ☐ Hindi

Ano ang pangalan ng mga pasilidad ng pangangalagang pangkalusugan sa kung saan ka nagtrabaho? _____

Ano ang lokasyon ng mga pasilidad ng pangangalagang pangkalusugan sa kung saan ka nagtrabaho?_____

Saan sa mga pasilidad ng pangangalagang pangkalusugan ka nagtatrabaho?_____

Ano, o sa aling (mga) departamento ng pasilidad na ito sa pangangalaga ng kalusugan ka nagta trabaho?_____

Mayroon ka bang anumang mga contact sa mga biological ispesimen sa panahon ng iyong trabaho? _____ ☐ Meron ☐ Wala ☐ Di Alam

Humahawak ka ba ng maruming gamit ng pasyente tulad ng linens sa panahon ng iyong trabaho? ☐ Oo ☐ Hindi ☐ Di Alam

Nagtatrabaho ka ba sa isang silid kung saan nagkaroon ng mga pasyente MERS-CoV?

PERSONAL PROTECTIVE EQUIPMENT AND HYGIENE PRACTICES if you also worked in a health care facility in the last 3 months

7. What personal protective equipment do you usually wear when working at the health care facility?

☐ No protective equipment used ☐ Gloves ☐ Coveralls

☐ Dust masks ☐ Boots or boot covers ☐ Respirators ☐ Eye protection (goggles, safety glasses) ☐ Others:_____

PERSONAL NA KAGAMITANG PANGHARANG AT KALINISAN NA NAKASANAYAN kung ikaw rin ay nagtrabaho sa isang pasilidad ng pangangalagang pangkalusugan sa nakaraang 3 buwan

Ano ang personal na proteksiyon kagamitan ay karaniwang mo magsuot kapag nagtatrabaho sa mga pasilidad ng pangangalaga ng kalusugan?

☐ Walang kagamitang pangproteksyon na ginamit ☐ Guwantes ☐ Coveralls

☐ Dust masks ☐ Boots or boot covers ☐ Respirators

☐ Proteksyon sa mata (goggles) ☐ At Iba pa: _____

8. **How often do you usually wash your hands while working at the health care facility (check all)**

☐ At mealtimes ☐ Before and after each animal related task ☐ At bathroom times

☐ The beginning and end of the day ☐ Rarely

Gaano kadalas ka kadalasang naghuhugas ng inyong mga kamay habang nagtatrabaho sa iyong pangunahing trabaho (i-check ang lahat)

☐ sa oras ng kainan ☐ Bago at pagkatapos ng bawat gawain na may kaugnayan sa hayop
☐ sa oras ng pagba banyo ☐ Sa pag simula at pagtatapos ng araw ☐ Madalang

Pregnancy

3. Are you pregnant? ☐ YES ☐ NO ☐ UNKNOWN

Ikaw ba ay buntis? ☐ OO ☐ HINDI☐ DI MATUKOY

4. If no, were you pregnant in the last six months? ☐ YES ☐ NO ☐ UNKNOWN

Kung Hindi, ikaw ba ay buntis sa huling anim na buwan? ☐ OO ☐ HINDI☐ DI MATUKOY